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COCHRANE COMMENTARIES

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Cardiac testing for coronary artery disease in potential kidney transplant recipients

What is this review about?

Screening for coronary artery disease is an important part of pre-transplant assessment for kidney transplant candidates. We investigated the accuracy of non-invasive cardiac screening tests compared with coronary angiography to detect coronary artery disease in potential kidney transplant recipients.

What are the findings?

Dobutamine stress echocardiography [pooled sensitivity 0.79, 95% CI 0.67 to 0.88, pooled specificity 0.89, 95% CI 0.81 to 0.94] and myocardial perfusion scintigraphy [pooled sensitivity 0.74, 95% CI 0.54 to 0.87, pooled specificity 0.70, 95% CI 0.51 to 0.84] had moderate sensitivity and specificity in detecting coronary artery disease. There was evidence that Dobutamine stress echocardiography had improved accuracy over myocardial perfusion scintigraphy ($P = 0.02$) when all studies were included in the analysis, but this was not significant when we excluded studies of poorer methodological quality, or which defined significant coronary disease using a higher threshold of ≥70% stenosis ($P = 0.09$).

What are the findings based on?

This was a systematic review of diagnostic accuracy, and included meta-analysis using data from 13 dobutamine stress echocardiography studies (745 participants) and nine myocardial perfusion scintigraphy studies (582 participants). It also included three echocardiography studies, two exercise stress electrocardiography studies, three resting electrocardiography studies and one study each of electron beam computed tomography, exercise ventriculography, carotid intimal media thickness and digital subtraction fluorography. We used a hierarchical modelling strategy to produce summary receiver operating characteristic curves, and pooled estimates of sensitivity and specificity.

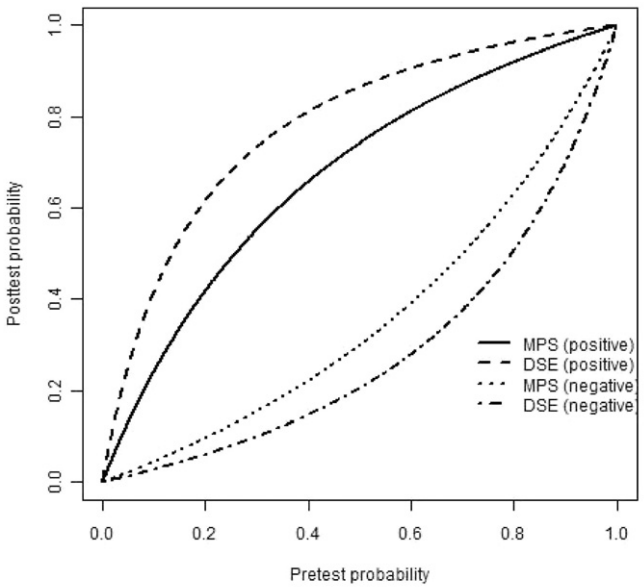
Implications for practice

Both tests, especially dobutamine stress echocardiography, have a role as triage tests for intermediate risk transplant candidates, with negative results precluding the need for further evaluation with coronary angiography, thereby avoiding unnecessary risk to patients and potentially reducing healthcare costs. The true discriminating value of both tests (especially dobutamine stress echocardiography) is in detecting coronary artery disease in intermediate risk patients – a category that includes many potential kidney transplant recipients. Both tests help to stratify patients at intermediate risk into either high or low risk categories. When dobutamine stress echocardiography was used, patients at intermediate risk of coronary artery disease who tested positive had post-test probability of 73% to 90% (high risk) and those who tested negative were downgraded to low risk (10% to 27%).

Clinical perspective

Physicians assessing potential kidney transplant recipients often face the dilemma of choosing which type of non invasive stress testing to use. Both non invasive tests have only moderate sensitivity and specificity. Coronary angiography, however, is invasive, and for those patients not yet on haemodialysis, exposure to intra-arterial contrast poses considerable risk of worsening renal function. Non invasive diagnostic imaging has evolved in the past decade. Myocardial perfusion scintigraphy has seen advances in both stress agent and radioactive perfusion tracer, both of which may have resulted in improvements in diagnostic accuracy. Dobutamine stress echocardiography has also matured as an imaging modality. Use of other imaging modalities, such as CT coronary angiography and cardiac MRI, has also become more widespread, but there are significant barriers to implementation in the chronic kidney disease patient population. Current evidence suggests that, where feasible, dobutamine stress echocardiography should be used as the screening investigation of choice over myocardial perfusion scintigraphy. Myocardial perfusion scintigraphy and dobutamine stress echocardiography may also provide additional prognostic information, which will be the focus of a future review.

Cardiac testing for coronary artery disease in potential kidney transplant recipients. Wang L, Fahim M, Hayen A, Mitchell R, Baines L, Lord S, Craig J, Webster A. *Cochrane Database of Systematic Reviews*. 2011:Issue 12. Art. No.: CD008691. DOI: 008610.001002/14651858.CD14008691.pub14651852



Test	Pre-test probability of coronary artery disease	Post-test Probability (%) after positive result†	Post-test Probability (%) after negative result†
Dobutamine stress echocardiography	Low risk (10-29%)	42-72%	3-10%
	Intermediate risk (30-59%)	73-90%	10-27%
	High risk (60-90%)	91-98%	28-70%
Myocardial perfusion scintigraphy	Low risk (10-29%)	24-54%	5-15%
	Intermediate risk (30-59%)	55-81%	16-38%
	High risk (60-90%)	81-96%	39-79%

Post-test probabilities for significant coronary artery disease in potential kidney transplant recipients. †Based on the positive and negative likelihood ratios calculated from the systematic review in studies which avoided partial verification and used a reference standard threshold of ≥70% stenosis. DSE had a positive likelihood ratio of 6.44 (95% CI 3.03 to 13.70) and negative likelihood ratio of 0.26 (95% CI 0.13 to 0.50). MPS had a positive likelihood ratio of 2.89 (95% CI 1.39 to 5.99) and negative likelihood ratio of 0.43 (95% CI 0.23 to 0.80).